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DEVELOPMENT OF STUDENT WORKSHEET USING WRITING-TO-LEARN STRATEGY ON ELECTROLYTE AND NONELECTROLYTE SOLUTION TOPIC FOR DEAF SENIOR HIGH AND VOCATIONAL SCHOOL STUDENT IN INCLUSIVE CLASS

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Abstract

The aims of this study are to determine the feasibility of student worksheet using Writing-to-Learn (WTL) strategy on electrolyte and nonelectrolyte solution topic for deaf senior high and vocational school student in inclusive class. The method that used was the Research and Development (R & D), but this research was conducted until product testing. The target of this research was student worksheet using writing-to-learn strategy. The instrument used was reviewer sheet, validation sheet, student responses sheet, pretest–posttest sheets, and WTL activity assesment sheet. Student worksheet tested in limited to two high school students and two vacational students each school 1 subject of deaf student in inclusive class. The result showed that worksheet with WTL strategy on electrolyte and nonelectrolyte solution topic had been developed very feasible theoretically and empirically to be used as a learning media. That was showed from percentage of the validity of the theoretically gain 87.96%. While the empirical validity of student responses gain 82.15%.

Keywords: Student worksheet, The strategy of *Writing-to-Learn*, Electrolyte solution and nonelectrolytes topic, Inclusive

Abstrak

Penelitian ini bertujuan untuk mengetahui kelayakan Lembar Kegiatan Siswa (LKS) menggunakan strategi Writing-to-Learn (WTL) pada materi larutan elektrolit dan nonelektrolit untuk siswa SMA dan SMK tunarungu di kelas inklusif. Metode yang digunakan adalah Research and Development (R&D), penelitian ini hanya terbatas pada tahap ujicoba produk. Sasaran penelitian ini adalah LKS menggunakan strategi writing-to-learn. Instrumen yang digunakan adalah lembar telaah, lembar validasi, lembar angket respon siswa, lembar pretest – posttest, dan lembar penilaian aktivitas WTL. LKS diujicobakan secara terbatas pada 2 siswa SMA dan 2 siswa SMK masing-masing sekolah 1 subjek siswa tunarungu di kelas inklusif. Hasil penelitian menunjukkan bahwa LKS dengan strategi WTL pada materi larutan elektrolit dan nonelektrolit yang dikembangkan telah sangat layak secara teoritis dan empiris untuk digunakan sebagai media pembelajaran. Hal ini ditunjukkan dari prosentase hasil validitasi teoritis mendapatkan presentase sebesar 87,96%. Sedangkan validitas empiris yaitu respon siswa mendapatkan prosentase sebesar 82,15%.

Kata Kunci: *Kelayakan media LKS, Strategi Writing-to-Learn, Larutan elektrolit dan nonelektrolit, Inklusif*

INTRODUCTION

Education is the foundation for the growth and progress of a country. Education is a mandatory requirement to be in get by all levels of Indonesian society is no exception for those who have kelaianan or children with special needs. Written in The Constitution of the

Republic of Indonesia in 1945 (UUD 1945) Article 31, paragraph 1 states, "Every citizen has the right to education". Then in perjelaskan further in Law No. 20 2003 Article 11, paragraph 1 states, "The government and local governments are required to provide services and ensure the implementation of quality education for all Indonesian citizens without any discrimination" [1].

Every child has the right successor generation of the nation achieve its goals both normal children and children with special needs. Described in the Law no. 20 years 2003 Article 32 of the National Education System, which states that "special education is education for students who have difficulty in following the learning process because of physical, emotional, intellectual, social, and / or have the potential for intelligence and special talents". This relates to special education that every child deserves a proper education without seeing the limitations experienced [2].

Education for children with special needs who have done is to establish special schools (SLB) which is divided into SLB for the blind, SLB for deaf and speech impaired, SLB for retarded. This means that children with special needs are distinguished school or separated from normal children. Special education in question is held in special education inclusive or special education unit. Embodiments of Law No.20 years 2003 was started in 2001 Directorate of Special Education instructed to all districts / cities to develop inclusive schools in elementary, junior high, high school, vocational school each one [3].

Inclusive education is defined as providing education system that provides opportunities for all students who have the disorder and has a special talent for education or learning in environmental education together with the learners in general . Thus , inclusive education provides ample opportunity for children with special needs to obtain a quality education in accordance with the needs and abilities and learn together with normal children in inclusive schools [2].

The handling of each type of disability is certainly different. Because each type of disability has different characteristics, including the deaf. Students with special needs said deaf when impaired hearing system. As a result, you will see several disorders, especially in the development of speech and language. Students with special needs who like this will obviously find it difficult to capture and understand the material presented verbally by the teacher so that the students' understanding of abstraction and imagination become obstructed . Thus the deaf students require a tool in the learning process, especially that accentuates the visual and physical side of the material being taught [4].

In accordance with the results of interviews with the Head of Section of Education, Department of Education and Culture of East Java province on March 11, 2014 that deaf students may be necessary to get more attention because every year there is always the deaf students in inclusive schools and vocational high school level, especially in East Java. The results of field studies at several high schools and vocational schools in East Java inclusive, facts on the ground learning methods are used in the inclusive

classroom teacher gives verbal comunication in chemical material like in regular classes so difficult to follow the teaching for deaf students well as hearing loss. When teaching deaf students to maximize the sense of vision to understand the material that is taught. They observed the teacher's motion lips when describing the material, but the way it is less than the maximum because deaf students still difficult to understand the material being taught. Some schools help students with hearing impairment through a special assistant teacher who acts as an interpreter of verbal language into sign language which is understood by the deaf students, but not all inclusive school teachers have a special assistant teacher. Facilities and adequate infrastructure is in need for the sake of learning fluency deaf students in inclusive classrooms. The evidence suggests that the chemical material taught in high school and vocational school requires imagination and a high abstraction power by students. If the learning is only delivered verbally without the visual side of the chemical material would be quite difficult to understand especially by deaf students who are weak in verbal comprehension. So that deaf students need for learning media supported with pictures or animations that can support the power of abstraction deaf students in learning and to provide for the development of the learning process and learning how deaf students [4].

One alternative that can be used to help deaf students in learning chemistry is developing a learning device in accordance with the needs of deaf students to more easily understand the material being taught chemistry. In the learning process Curriculum 2013, the teacher is no longer a major role because students can learn without having to wait for an explanation from the teacher but can take advantage of the learning resources available. One of the learning resources that can be developed is the Student Worksheet (LKS) [5].

Student worksheet are sheets containing tasks that must be done by the students. Worksheet contains instructions, the steps to complete a task. The tasks given to the student can be either theory or practice. LKS developed using a writing-to-learn strategy's, used writing-to-learn strategy's is expected to be able to solve problems more complex or related to the experiment. LKS development using writing-to-learn strategy's for deaf students in inclusive classrooms have differences with LKS in general. The difference is in terms of language and how to communicate it. The language used is simple, the length of the sentence in accordance student comprehension ability, and vocabulary used easy to understand. As for communicating, hearing impairment due to deaf students, causing limitations to communication, the writing is one way to help communicate their opinions.

Lang [6] argue one way for deaf students to express what they are experiencing and reached significance in the learning process is the way to write. Write to learn, or better known as the strategy of writing-to-laern (WTL). WTL strategy can facilitate students in particular deaf students in learning to help explore, mengklararifikasi, and think to express important ideas from the readings. WTL strategy has been proven to help deaf students in learning, especially the concepts of science, but not specific to

chemistry concepts. The strategy has several activities that use is tailored to the needs and characteristics of the material presented, namely: (1) Creative piece, students are asked to describe a situation, object, or living things and write things what they noticed in their depiction of the then teachers discussed together with students about what is described by the students; (2) Guided free writing, teachers guide students to write comments in a science activity with more specific objectives; (3) End-of-class reflection, the end of the lesson the teacher invites students to think and write down some important things that students get in the learning process; (4) Double entry, students are asked to copy a paragraph in the article that they choose kemuadian they were asked to write a comment in the form of statements agree or not and possibly other comments related articles they choose. WTL strategy which would be applicable to the worksheet because WTL strategy matches with the learning styles of deaf students in inclusive classrooms, WTL strategy applied to the worksheet is Creative piece, Guided free writing, and End-of-class reflection.

Based on the above, the researchers will conduct a study with the title "Development Of Student Worksheet Using Writing-to-Learn Strategy On Electrolyte Solution Topic For Deaf Senior High And Vocational School Student In Inclusive Class"

METHOD

This research is a research and development (R & D). research and development is a method used to examine to produce new products, and then test the effectiveness of these products [9]. This research is the development of student worksheet using writing-to-learn strategy on electrolyte solution topic for deaf senior high and vocational school student in inclusive class that contains experiments and tasks in accordance with the material. After LKS tested and found feasible it will be conducted research student responses.

Subjects of this study consisted of four deaf students who were in class inclusive of several high schools and vocational schools in East Java with a different background.

Research instrument used in the study to collect data covering reviewer sheet, validation sheet, student questionnaire responses sheet, the booklet pretest-posttest, and WTL activity assessment sheet.

Method of Data Analysis

Data from reviewer from chemistry lecturer and chemistry teachers who teach in inclusive classrooms to LKS developed be analyzed descriptively and then implemented in the revision or repairs before validation to determine the feasibility theoretically.

The data validation result was analyzed by using quantitative descriptive method. Percentage of questionnaire data is obtained based on the calculation of the Likert scale as the Table 1.[8]

Table 1. Likert Scale

Criteria	Score
Very Good	4
Good	3
Good Enough	2
Enough	1
Very Bad	0

The formula used in the calculation to obtain the percentage is:

$$Percentage\ (\%) = \frac{Total\ score\ result}{Score\ criteria}\ x\ 100\%$$

Score criteria obtained through the following calculation:
Score criteria = Highest Score x Total aspects x Total reviewer

The results of the validation sheet analysis is used to determine the feasibility of Student Activity by using the interpretation of the score as follows: [8]

Table 2. Interpretation Score

Precentage(%)	Category
0 - 20	Not Feasible
21 - 40	Less Feasible
41 - 60	Feasible Enough
61 - 80	feasible
81 - 100	Very Feasible

Based on the interpretation criteria, Student Activity Sheet is said as feasible if the content, presentation, conformity with inquiry learning models, and the suitability of higher order thinking skills component if its results was achieving ⩾ 61%, so it can be used in the learning process.

Data on students' responses obtained from the student questionnaire responses after using worksheet. Questionnaire for students, made in "Yes" or "No" answer. Percentage of questionnaire data was analyzed by using Guttman scale which is calculated based on the following table :[8]

Table 3. Guttman Scale

Answer	Score
Yes	1
No	0

Data that obtained are calculated by using the formula:

$$Percentage\ (\%) = \frac{Total\ score\ result}{Score\ criteria}\ x\ 100\%$$

Score criteria obtained through the following calculation:
Score criteria = Highest Score x Total aspects x Total reviewer

Percentage that has obtained is interpreting in the criteria that contained in the Table 2.

Based on these criteria, worksheets using a writing-to-learn strategy's in this study is feasible and positive student getting the response when the percentage of ⩾ 61%.

Data from pretest-posttest be analyzed descriptively based on the results of the pretest and posttest student gained are used to determine changes in the students' understanding after using worksheets that developed. Students are said to be complete when mendapay value of ⩾ 65.

Data from writing-to-learn activity assessment during use worksheets that developed be analyzed descriptively based on writing-to-learn activity assessment rubric that have been made. Assessment is based on the formula below.

$$\mathbf{Score} = \frac{\boldsymbol{Total\ Score\ Result}}{\boldsymbol{Score\ Criteria}} \times \mathbf{100}$$

RESULT AND DISCUSSION

Validation

Validation worksheet is based on the feasibility of content, presentation and linguistic. This feasibility assessed by a chemistry lecturer, graduate student majoring in special education, and chemistry teachers who teach in inclusive classrooms.

worksheet is feasible if a percentage feasibility of ≥ 61% [8]. worksheet

validation results on several aspects of the criteria indicated by Table 4.

Table 4. Validation Result

Aspect	Percentage	Criteria
Content Criteria	89.78%	Very Feasible
Presentation Criteria	88.63%	Very Feasible
Linguistic Criteria	84.28%	Very Feasible
Average	87.96%	Very Feasible

The results of the overall validation get a percentage of 87,96% with a very feasible criteria.

WTL Activity

Subjects were asked to perform some activity WTL which has been integrated in the worksheet when done limited testing. Judging is based on a rubric WTL activity.

Table 5. WTL Activity Data

Activity	Rubric Score			
	Sub 1	Sub 2	Sub 3	Sub 4
Creative Piece	3	3	3	3
Guided Free Writing	3	3	3	3
End-of-Class Reflection	1	2	1	2
Score	7	8	7	8
Max Score	9	9	9	9
Final Score	**77.78**	**88.89**	**77.78**	**88.89**

Based on the results of the assessment WTL activity, each subject received a high enough value. Research subjects can perform well WTL activity

Pretest* and *Posttest

Before the trial worksheet, research subjects were given about the pretest to determine the ability of the student early on the material of the electrolyte solution. Pretest consisted of 10 multiple choice questions. After testing the worksheet, research subjects were given 10 multiple choice questions as a posttest. It aims to determine mastery of the material after studying with the help of worksheet.

Tabel 6. Pretest and Posttest Result

Subject	Score	
	Pretest	Posttest
Sub 1	10	70
Sub 2	20	70
Sub 3	20	90
Sub 4	60	90

All of the subjects did not complete the pretest, but after working on all subjects completed the posttest questions. This shows all subjects experienced an improved understanding of the material electrolytr and Non-electrolytes solution after use worksheets. This is in line with the opinions Fenrich [7] that student worksheet can make students learn individually according to his ability, and choose the things they want to learn.

Student Response

After the test, research subjects were asked to complete a questionnaire responses of students to determine the feasibility of worksheet empirically. Feasibility worksheet indicated by

respondents in several aspects such as that shown in Table 7.

Tabel 7. Student Response Result

Aspect	Percentage	Criteria
Interest	83.35%	Very Feasible
Technical suitability views	81.83%	Very Feasible
Average	82.15%	Feasible

The results of student questionnaire responses overall percentage of 82.15% gain with very feasible criteria.

Discussion of Each Subject

Subject 1

Subjects when tested using the worksheets and laboratory work contained in LKS can do well. Pretest value in the can is 10 points, this value is very low. This is because the subject does not understand the material electrolyte solution. We conducted posttest values obtained 70 points, can be seen an increase in the value of 60 points so it can be concluded that the subjects experienced increasing understanding after using worksheets developed. During the testing process can subject the stages practicum well. Subjects received a score of 77.78 in the activity wtiring-to-learn, the creative part piece scored 66.68, the subject still difficulties when making inquiries, formulate problems and create hypotheses. To make inquiries need a guide in order to understand the meaning of the phenomenon so familiar to make inquiries. At the stage of formulating the problem and make hypotheses also need a guide, the subject does not understand what is meant by formulating problems and create hypotheses. When the scout subjects begin to understand and be able to formulate problems and create hypotheses.

On the Guided free writing scored 88.89, the subject can fill the job with a good step to see the images contained in the job step. When the subject forgot the name of the tool and the material, the subject will look back at the list of tools and materials contained in the front. At this stage the subject can do with ease. At the stage end-of-Class-Reflection scored 77.78, the subject can make the conclusion of the experiment by looking at the analysis of the experiments that have been carried out.

Subject 2

Subjects when tested using the worksheets and laboratory work contained in LKS can do well. The pretest value that can be the subject was 60 points, this value is quite high. This is because the subject is still considering the matter electrolyte solution. When done posttes values obtained 90 points, can be seen an increase in the value of 30 points so it can be concluded that the subject of one experiencing increasing understanding after using worksheets developed. During the process of testing the subject can perform stages practicum well. Results of activity score wtiring-to-learn gets 88.89. On the creative piece scored 77.78, the subject still difficulties when making inquiries at 1. Then at LKS 2 and LKS 3, the subject was able to create their own questions. On the Guided free writing gets

a value of 100, the subject can fill the job with a good step to see the images contained in the job step. Subject has a high recall, the subject can fill all work steps well. At the stage end-of-Class-Reflection scored 88.89, the subject can make the conclusion of the experiment well. Subject was able to draw their own conclusions without being guided.

Subject 3

Subjects when tested using the worksheets and laboratory work contained in LKS can do well. The pretest value that can be the subject was 20 points, this value is very low. This is because the subject is not familiar with the material electrolyte solution. When done posttes values obtained 70 points, can be seen an increase in the value of 50 points so it can be concluded that the subjects experienced increasing understanding after using worksheets developed. During the process of testing the subject can perform stages practicum well. Scores obtained in the activity wtiring-to-learn is 77.78. On the creative piece scored 66.67, the subject still difficulties when making inquiries. To make inquiries need a guide in order to understand the meaning of the phenomenon so familiar to make inquiries. At the stage of formulating the problem and make hypotheses also need a guide, subject does not understand what is meant by formulating the problem and make hypotheses. When the scout subjects begin to understand and be able to formulate problems and create hypotheses. On the Guided free writing scored 77.78, the subject can fill the job with a good step to see the images contained in the job step. When the subject forgot the name of the tool and the material, the subject will look back at the list of tools and materials contained in the front. At the stage end-of-Class-Reflection scored 77.78, the subject can independently work on the analysis of the data well and make conclusions from the results of the experiment.

Subject 4

Subjects when tested using the worksheets and laboratory work contained in LKS can do well. The pretest value that can be the subject was 20 points, this value is very low. This is because the subject is not familiar with the material electrolyte solution. We conducted posttest values obtained 90 points, can be seen an increase in the value of 70 points, the increase is very high so it can be concluded that the subjects 4 experienced increasing understanding after using the worksheets developed. During the process of testing the subject can perform stages practicum well. Scores of activity wtiring-to-learn to get 88.89. On the creative piece scored 77.78, the subject still difficulties when making inquiries on LKS 1. On LKS 2 and LKS 3, the subject was able to create their own questions, it is in because sabjek easily understood after the scout in making inquiries, making the formulation of the problem and hypotheses that guided the Worksheet 1. In the Guided free writing gets a value of 100, the subject can fill the job with a good pace to the figures contained in the working steps. When the subject forgot the name of the tool and the material, the subject will look back at the list of tools and materials contained in the front. At the stage end-of-Class-Reflection scored 88.89, the subject can make the

conclusion of the experiment on their own without a guide.

CLOSURE

Conclusion

Based on the analysis of the research results and discussion, it can be concluded that student worksheet which developed feasible for use as a learning media with details of the following results:

1. Feasibility of worksheet (LKS) using wrtiting-to-learn strategies which have been developed in terms of fulfilling the criteria of contents, linguistic criteria and the criteria of presentation is very feasible so worksheets can be used as a learning media.
2. Student responses to the worksheet (LKS) using wrtiting-to-learn strategy which have been developed are very feasible so worksheets can be used as a learning media.

Suggestion

1. Completing worksheets using Wrtiting-to-Learn strategy that have been developed with videos experiment so that deaf students can imitated experiment steps .
2. Applying LKS using writing-to-learn strategy that have been developed as a learning media for deaf students and normal students in inclusive classrooms.

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